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Kramer Electronics, Ltd.

USER MANUAL

Model:

910

Digital Audio Preamplifier

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Contents

1	**Introduction**	**1**
2	**Getting Started**	**1**
2.1	Achieving the Best Performance	2
2.2	Safety Instructions	2
2.3	Recycling Kramer Products	2
2.4	Quick Start	3
3	**Overview**	**4**
4	**Your 910 Digital Audio Preamplifier**	**4**
5	**Installing the 910 in a Rack**	**8**
6	**Connecting the 910 Digital Audio Preamplifier**	**9**
6.1	Connecting the RS-232 Port	10
6.2	Connecting the ETHERNET Port	10
6.2.1	Connecting the ETHERNET Port Directly to a PC (Crossover Cable)	11
6.2.2	Connecting the ETHERNET Port via a Network Hub (Straight Through Cable)	12
6.2.3	Configuring the Ethernet Port	12
6.3	Connecting via USB	14
6.4	Connecting a Microphone to the XLR Input	14
7	**Operating the 910 Digital Audio Preamplifier**	**15**
7.1	Using the Front Panel Buttons	15
7.1.1	Using MIX 15	
7.1.2	Using Loudness	15
7.1.3	Using Talkover	15
7.1.4	Using Store 15	
7.1.5	Using Recall 15	
7.2	Controlling the 910 from the PC	17
7.3	Using the Infrared Remote Controller	17
7.4	Updating the 910 Firmware	17
8	**Technical Specifications**	**18**
9	**Protocol 3000 Syntax**	**19**
9.1	Host Message Format	19
9.1.1	Simple Command	19
9.1.2	Command String	19
9.2	Device Message Format	19
9.2.1	Device Long Response	19
10	**910 Commands in Protocol 3000**	**20**
10.1	Help Commands	20
10.2	Device Initiated Messages	20
10.3	Result and Error Codes	20

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10.4 Basic Routing Commands 21
10.5 Preset Commands 21
10.6 Audio Parameter Commands 22
10.7 Identification Commands 23
10.8 Network Setting Commands 23
10.9 Machine Information Commands 24
10.10 Command Terms 24
10.11 Entering Commands 25
10.12 Command Forms 25
10.13 Command Chaining 25
10.14 Maximum String Length 26
10.15 Backward Support 26

Figures

Figure 1: 910 Digital Audio Preamplifier 5
Figure 2: Connecting the 910 Digital Audio Preamplifier 10
Figure 3: Local Area Connection Properties Window 11
Figure 4: Internet Protocol (TCP/IP) Properties Window 12
Figure 5: Connect Screen 13
Figure 6: Device Properties Screen 14
Figure 7: Connecting a Microphone to the XLR Input 14
Figure 8: 910 Control Application Screen 17

Tables

Table 1: 910 Digital Audio Preamplifier Functions 6
Table 2: 910 Front Panel Button Functions 16
Table 3: 910 Technical Specifications 18

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Thank you for purchasing the Kramer **910** *Digital Audio Preamplifier,* which is ideal for:

- Professional audio applications
- Sound studios
- Boardrooms and classrooms
- Training applications

Each package includes the following items:

- The **910** Digital Audio Preamplifier
- Power cord
- **RC-IR2** remote control transmitter
- Windows®-based Kramer control software
- This user manual

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

Go to http://www.kramerelectronics.com to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

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2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **910** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may be connected only to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: No operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit.

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

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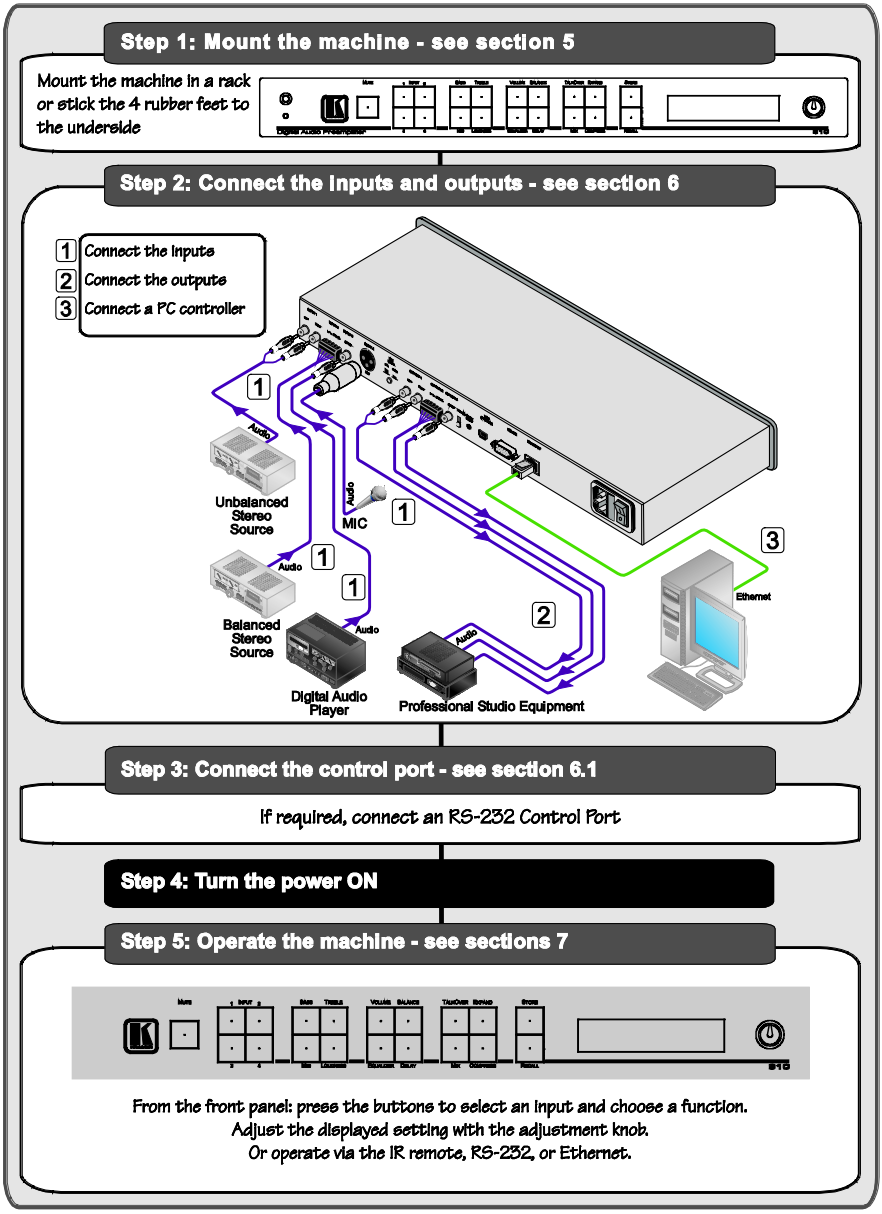
2.4 Quick Start

This quick start chart summarizes the basic setup and operation steps.


Step 1: Mount the machine - see section 5
Mount the machine in a rack or stick the 4 rubber feet to the underside
Step 2: Connect the inputs and outputs - see section 6
1 Connect the Inputs
2 Connect the outputs
3 Connect a PC controller
Unbalanced Stereo Source
MIC
Balanced Stereo Source
Digital Audio Player
Professional Studio Equipment
Ethernet
Audio
Step 3: Connect the control port - see section 6.1
If required, connect an RS-232 Control Port
Step 4: Turn the power ON
Step 5: Operate the machine - see sections 7
From the front panel: press the buttons to select an input and choose a function.
Adjust the displayed setting with the adjustment knob.
Or operate via the IR remote, RS-232, or Ethernet.

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3 Overview

The **910** is a high-performance stereo audio preamplifier. It accepts balanced and unbalanced stereo audio, S/PDIF digital audio, and microphone inputs, processes the signals, and outputs them to balanced, unbalanced and S/PDIF outputs.

The **910** has the following features:

- Grouped audio controls: volume, balance, bass, mid, treble, loudness, equalizer, delay, mute, expand and compress
- Selectable condenser or dynamic mic input with talk over, mix and override controls
- A 24-character by 2-line LCD display
- Memory locations that store up to 4 presets to be recalled and executed when needed
- A USB port for software upgrades
- Flexible control options including the front panel, RS-232 (with Windows®-based control software included), Ethernet and IR
- Standard 19” rack mount size of 1U with rack "ears" included

To achieve the best performance:

- Use only good quality connection cables[1] to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **910** away from moisture, excessive sunlight and dust

4 Your 910 Digital Audio Preamplifier

Figure 1 and Table 1 define the unit.

1 Available from Kramer Electronics on our Web site at http://www.kramerelectronics.com

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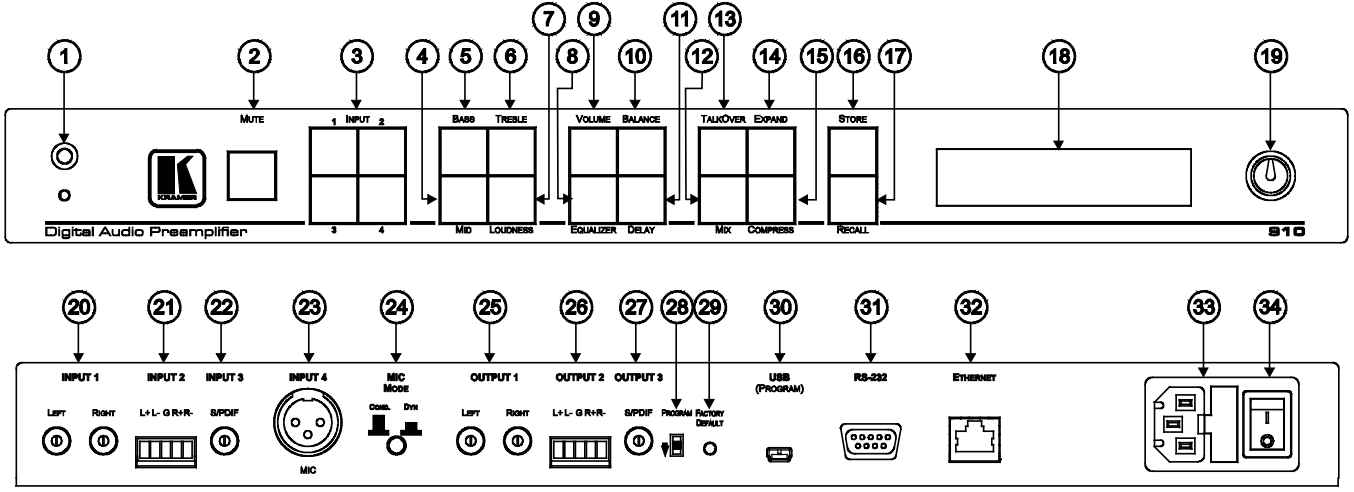

Figure 1: 910 Digital Audio Preamplifier

Table 1: 910 Digital Audio Preamplifier Functions

#	Feature	Function
1	IR Receiver	The red LED illuminates when receiving signals from the infrared remote control transmitter
2	*MUTE* Button	Press to toggle between turning off (muting) and turning on the audio output
3	*INPUT* Selector Buttons	Press a button to select an input (1 to 4)
4	*MID* Button	Press to adjust midrange frequencies on the selected input
5	*BASS* Button	Press to adjust low frequencies on the selected input
6	*TREBLE* Button	Press to adjust high frequencies on the selected input
7	*LOUDNESS* Button	Press to toggle loudness on the selected input
8	*EQUALIZER* Button	Press to adjust 7 different frequency bands on the selected input; each press advances to the next band
9	*VOLUME* Button	Press to adjust the output volume; to adjust the input volume press VOLUME and STORE together
10	*BALANCE* Button	Press to change the relative volume between the left and right channels on the selected input
11	*DELAY* Button	Press to adjust the delay in milliseconds on the output
12	*MIX* Button	Press to choose multiple inputs
13	*TALKOVER* Button	Press to allow the microphone to interrupt the selected input, the background audio fades out when the microphone is loud enough and fades in when the microphone is silent again
14	*EXPAND* Button	Press to increase the dynamic range of the output
15	*COMPRESS* Button	Press to decrease the dynamic range of the output
16	*STORE* Button	Press to save the device settings; use the adjustment knob or the input buttons to select the preset number
17	*RECALL* Button	Press to bring back a stored preset, use the adjustment knob or the input buttons to select the preset number
18	DISPLAY	2 line, 24 character LCD display
19	Adjustment Knob	Turn to adjust the value of the selected function
20	*INPUT 1 (LEFT, RIGHT)* RCA Connectors	Connect to an unbalanced stereo audio source
21	*INPUT 2* Terminal Block Connector	Connect to a balanced stereo audio source
22	*INPUT 3 S/PDIF* RCA Connector	Connect to a digital audio source
23	*INPUT 4 MIC* XLR Connector	Connect to a microphone. The XLR connector provides 15V phantom power when the MIC switch is set for a condenser microphone
24	*MIC MODE (DYN/COND.)* Pushbutton	Press IN for dynamic mic, set OUT for condenser mic
25	*OUTPUT 1 (LEFT, RIGHT)* RCA Connectors	Connect to an unbalanced stereo audio acceptor (power amplifier)
26	*OUTPUT 2* Terminal Block Connector	Connect to an balanced stereo audio acceptor (power amplifier)
27	*OUTPUT 3 S/PDIF* RCA Connector	Connect to a digital audio acceptor (digital power amplifier)
28	*PROGRAM* Switch	Slide down to upgrade the device firmware (see section 7.4); slide up for normal operation

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#	Feature	Function
29	*FACTORY DEFAULT* Button	Press to revert to the default settings, including all the configured buttons
30	*USB (PROGRAM)* Connector	Connect to the PC using a USB cable for remote control
31	*RS-232* 9-pin D-sub (F) Port	Connect to the RS-232 connector on the AV equipment or a PC or other serial controller for remote control
32	*ETHERNET* RJ-45 Connector	Connects to the PC or other serial controller through computer networking LAN for remote control
33	Power Connector with Fuse	AC connector enabling power supply to the **910**
34	Power Switch	Illuminated switch for turning the unit on and off

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5 Installing the 910 in a Rack

This section describes how to install the **910** in a rack.

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0º to +40ºC (32º to 104ºF)
STORAGE TEMPERATURE:	-40º to +70ºC (-40º to 158ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

2. Once rack mounted, enough air will still flow around the machine.

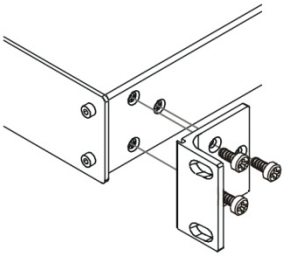
3. The machine is placed straight in the correct horizontal position.

4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

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6 Connecting the 910 Digital Audio Preamplifier

To connect the **910** as illustrated in the example in Figure 2[1]:

1. Connect the inputs:
   - Connect an unbalanced stereo source (for example, a tape recorder) to the left and right INPUT 1 RCA connectors
   - Connect an balanced stereo source (for example, a tape recorder) to the left (L+, L-), right (R+, R-) and ground (G) terminals on the INPUT 2 terminal block connectors
   - Connect a digital audio source (for example, a digital audio player) to the INPUT 3 S/PDIF RCA connector
   - Connect a microphone to the INPUT 4 MIC XLR connector (see Section 6.4). Set the MIC MODE button to Dynamic or Condenser (pressed in)
2. Connect the outputs:
   - Connect the left and right OUTPUT 1 RCA connectors to an unbalanced stereo audio acceptor (for example, a power amplifier)
   - Connect left (L+, L-), right (R+, R-) and ground (G) terminals on the OUTPUT 2 terminal block connectors to a balanced stereo audio acceptor (for example, a power amplifier)
   - Connect the OUTPUT 3 S/PDIF connector to a digital audio acceptor (for example, a digital power amplifier)
3. To remotely operate the **910**, make any of the following connections:
   - RS-232 9-pin D-sub port to a PC (see Section 6.1)
   - Ethernet RJ-45 connector to a network (see Section 6.2)
   - USB connector to a PC (see Section 6.3)
4. Connect the power cord[2] (not shown in Figure 2).

1 Switch off the power to each device before connecting it to the 910. After connecting the 910, switch on its power and then switch on the power to each device

2 We recommend that you use only the power cord supplied with this device

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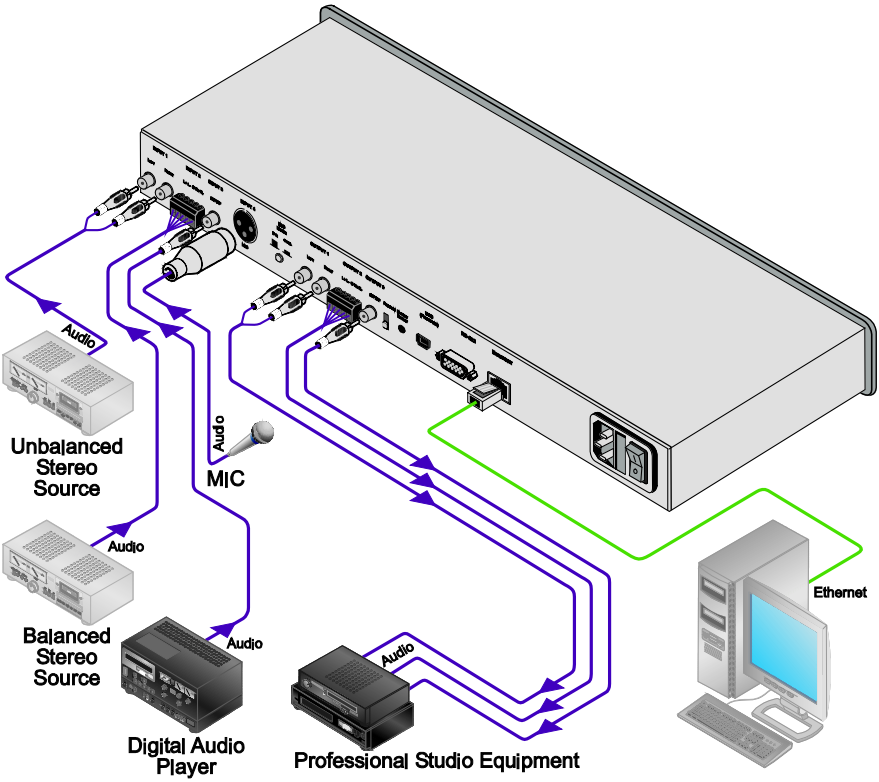

Figure 2: Connecting the 910 Digital Audio Preamplifier

6.1 Connecting the RS-232 Port

You can connect to the unit via a straight pin-to-pin RS-232 connection, using for example, a PC.

Connect the RS-232 9-pin D-sub port on the unit via a straight cable (pin 2 to pin 2, Pin 3 to pin 3, and pin 5 to pin 5) to the RS-232 9-pin D-sub port on the PC. Is a shielded cable is used, connect the shield to pin 5.

Note: There is no need to connect any other pins.

6.2 Connecting the ETHERNET Port

You can use the Ethernet port to control the **910**.

- To connect directly to a PC using a crossover cable, see Section 6.2.1

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- To connect to a network hub or network router with a straight-through cable, see Section 6.2.2
- To configure the Ethernet port, see Section 6.2.3

6.2.1 Connecting the ETHERNET Port Directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **910** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address of the **910** during the initial configuration

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button, (see Figure 3).

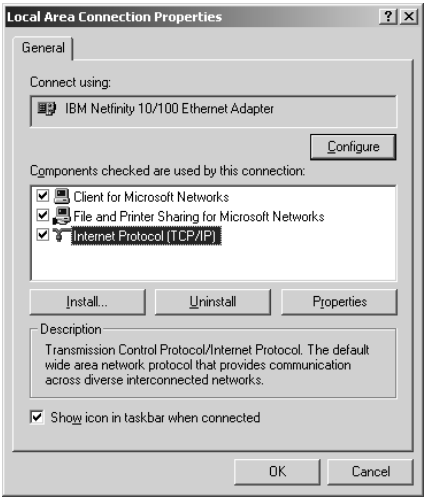

Figure 3: Local Area Connection Properties Window

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6. Select Use the following IP address, and fill in the details, (see Figure 4).
7. Click **OK**.

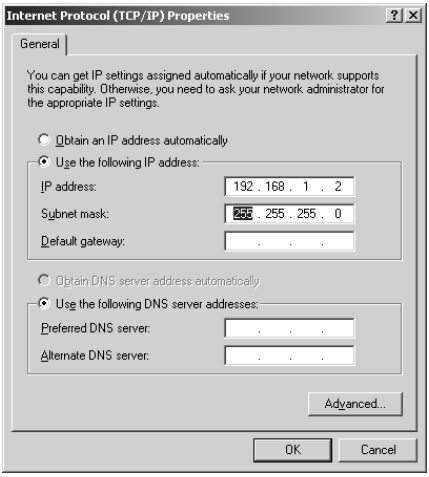
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 1 . 2
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 4: Internet Protocol (TCP/IP) Properties Window

6.2.2 Connecting the ETHERNET Port via a Network Hub (Straight Through Cable)

You can connect the Ethernet port of the **910** to the Ethernet port on a network hub or network router, via a straight through cable with RJ-45 connectors.

6.2.3 Configuring the Ethernet Port

To configure the Ethernet port, download the P3K configuration software[1]. Extract the file to a folder and create a shortcut on your desktop to the file.

Follow these steps to configure the port:

1. Double click the desktop icon.
   The Connect screen appears, (see Figure 5).

1 Available from Kramer Electronics on our Web site at http://www.kramerelectronics.com

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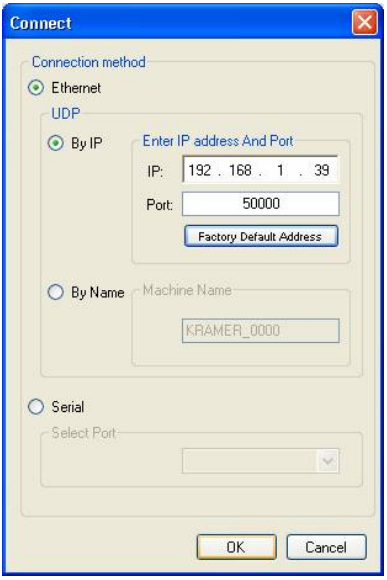

Figure 5: Connect Screen

2. Select the method to connect to the Ethernet port of the **910**.
   Select:
   - Ethernet, if you know the IP address number[1] or the machine name. The default name for the machine is KRAMER_XXXX[2]
   - Serial, if you are connected via a serial port
3. Click OK.
   The Device Properties window appears, (see Figure 6).

1 The default IP address is 192.168.1.39

2 The four digits are the last four digits of the machine's serial number

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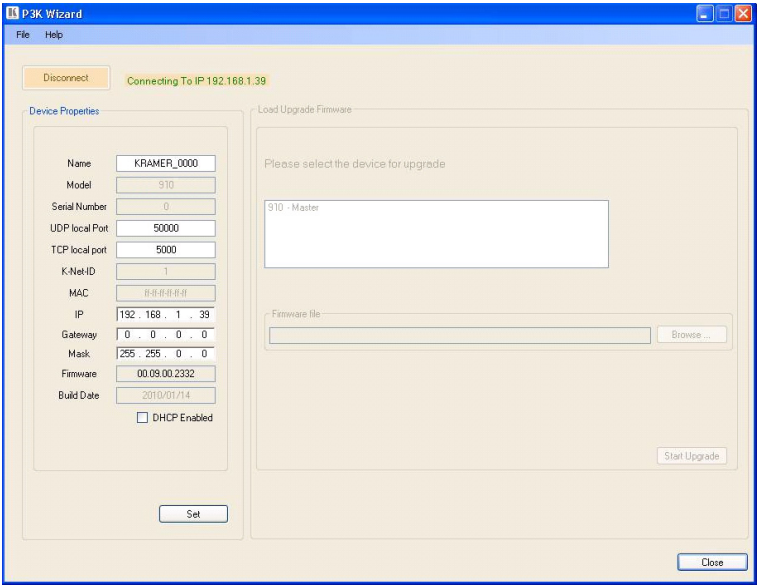

Figure 6: Device Properties Screen

4. If required, make changes and press Set. If not, click Close.

6.3 Connecting via USB

To connect the **910** via the USB port, you must plug the USB cable into the PC and install the Kramer USB driver downloaded from our Web site at http://www.kramerelectronics.com.

6.4 Connecting a Microphone to the XLR Input

Connect a microphone to the XLR input as illustrated in Figure 7.

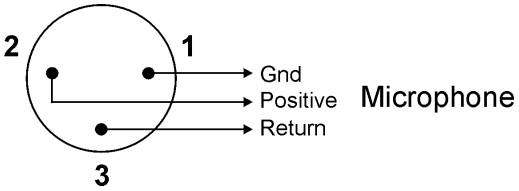

Figure 7: Connecting a Microphone to the XLR Input

Note: The XLR connector provides 15V phantom power when the MIC switch is set for a condenser microphone.

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7 Operating the 910 Digital Audio Preamplifier

You can operate your **910** using:

- The front panel buttons, (see Section 7.1)
- Serial commands via the RS-232/USB/Ethernet ports transmitted by a touch screen system, PC, or other serial controller, (see Section 7.2)
- **RC-IR2** Infrared remote control transmitter, (see Section 7.3)

7.1 Using the Front Panel Buttons

The **910** is operated from its front panel buttons as follows (for an explanation of the front panel button functions see Table 2):

1. Select an input from 1 to 4 by pressing its INPUT button. The selected input appears in the display.
2. Select a function by pressing its appropriate button. The selected input and function appear in the display.
3. Adjust the function using the adjustment knob.

7.1.1 Using MIX

To mix multiple inputs (any or all) press the MIX button and press any INPUT desired. Each selected input lights.

7.1.2 Using Loudness

Pressing LOUDNESS activates and deactivates the loudness function.

7.1.3 Using Talkover

To use the talkover function, press TALKOVER. The microphone on INPUT 4 activates. The audio fades out when the microphone input is loud enough and fades back in when the microphone is silent for approximately 1.5 seconds.

7.1.4 Using Store

Up to four current settings can be stored in four presets. To store a preset: press STORE, it flashes. Choose a preset location by turning the adjustment knob or pressing an INPUT button. Press STORE again to save the preset.

7.1.5 Using Recall

To recall any of the four presets: press RECALL, it flashes. Choose a preset location by turning the adjustment knob or pressing an INPUT button. Press RECALL to activate the preset.

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Table 2: 910 Front Panel Button Functions

Button Display	Function	Meaning/Range	Notes
MUTE	Mute		When pressed, stops all output
1 / 2 / 3 / 4	INPUT 1	Unbalanced stereo	Only one input lights when selected, multiple buttons light when MIX pressed
	INPUT 2	Balanced stereo	
	INPUT 3	S/PDIF digital stereo	
	INPUT 4	Microphone	
BASS / TREB / MID / LDNS	Bass	-40 to +40	Adjusts low-level tones
	Treble	-40 to +40	Adjusts high-level tones
	Mid	-40 to +40	Adjusts mid-level tones
	Loudness	-40 to +40	Toggles loudness on and off
VOL / BAL / EQ / DLY	Volume	-100 to +24	Adjusts output volume
	Balance	-24 to +24	Adjusts right and left volume
	Equalization	-40 to +40 each band	Equalizes 7 bands from low to high frequency; each press advances to the next band
	Delay	0 to 60	Delay in milliseconds to avoid feedback from the microphone
TR / EXPD / MIX / CMPS	Talkover		Activates INPUT 4 (mic) and lowers all other inputs to the background
	Expand		Increases the dynamic range of the output by a fixed ratio
	Mix		Allows multiple inputs
	Compress		Decreases the dynamic range of the output by a fixed ratio
STO / RCL	Store		Stores four presets: press STORE, adjust for preset number, press STORE
	Recall		Recalls four presets: press RECALL, adjust for preset number, press RECALL

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7.2 Controlling the 910 from the PC

To operate your device remotely from your PC over the RS-232, USB or Ethernet ports, you need to download and install Kramer's **910** Control Application[1].

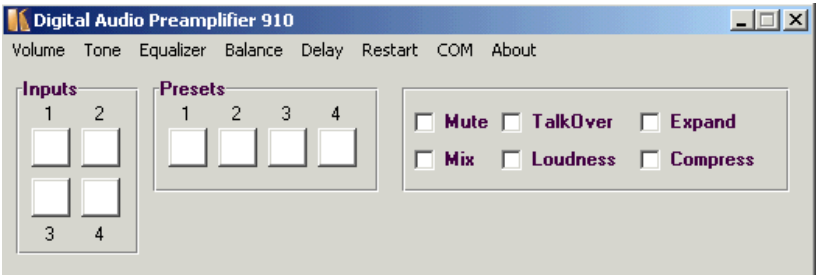

Figure 8: 910 Control Application Screen

For an explanation of all control commands, see Section 10.

7.3 Using the Infrared Remote Controller

To operate your device using the **RC-IR2** infrared remote controller, see the User Manual packed with the remote controller.

7.4 Updating the 910 Firmware

The **910** functions by means of a device microcontroller that runs firmware located in FLASH memory.

You can download[1] and upgrade the latest version of firmware[2] according to the recommendation of Kramer Technical Support.

1 Available on our Web site at http://www.kramerelectronics.com

2 The firmware is installed using the P3K software available from the Kramer Web site http://www.kramerelectronics.com

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8 Technical Specifications

The **910** technical specifications are shown in Table 3.

Table 3: 910 Technical Specifications[1]

INPUTS:	1 unbalanced stereo audio on an RCA connector; 1 balanced stereo audio on a 5-pin terminal block; 1 S/PDIF on an RCA connector; 1 mono balanced microphone on an XLR (F) connector (provides 15V phantom power when the MIC switch is set for a condenser microphone)
OUTPUTS:	1 unbalanced stereo audio on an RCA connector; 1 balanced stereo audio on a 5-pin terminal block; 1 S/PDIF on an RCA connector
OUTPUT LEVEL:	8Vpp
BANDWIDTH (–3dB):	21.7kHz
S/N RATIO:	75dB @1kHz, weighted
CONTROLS:	Volume: <–75 to +23.5dB; Bass: –15 to +15dB @100Hz; Mid: –20 to +20dB @1kHz; Treble: –10 to +10dB @20kHz; Balance: <–64 to 0dB @1kHz; Delay: 90usec to 300usec; Expand: +9.5dB @1kHz; Compress: –16dB @1kHz
VOLTAGE GAIN:	22.5dB at max gain
COUPLING:	AC
AUDIO THD + NOISE:	0.1% @1kHz
AUDIO 2nd HARMONIC:	0.03% @1kHz
POWER CONSUMPTION:	100-230V AC 9VA
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	–40° to +70°C (–40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
DIMENSIONS	19" x 7" x 1U (W, D, H)
WEIGHT:	2.0kg (4.4lbs)
ACCESSORIES:	Power cord, rack “ears”, IR remote control transmitter and Windows®-based Kramer control software

1 Specifications are subject to change without notice

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9 Protocol 3000 Syntax

9.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	*Destination_id*@	**Message**	CR

9.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

9.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	*Destination_id*@	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

9.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	*Sender_id*@	**Message**	CR LF

9.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	*Sender_id*@	**Command** SP [*Param1 ,Param2 …*] **result**	CR LF

CR = Carriage return (ASCII 13 = 0x0D)
LF = Line feed (ASCII 10 = 0x0A)
SP = Space (ASCII 32 = 0x20)

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10 910 Commands in Protocol 3000

This RS-232/RS-485 communication protocol lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application) and uses a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit.

This section describes all commands sent to the **910**. For an explanation of the syntax and use of Protocol 3000, see Section 10.

10.1 Help Commands

Command	Syntax	Response
Protocol handshaking	#CR	~OK CRLF

10.2 Device Initiated Messages

Command	Syntax
Start message	Kramer Electronics LTD. , Device Model Version Software Version
Switcher actions:	
Audio channel has switched (breakaway mode)	AUD IN>OUT

10.3 Result and Error Codes

	Syntax
Command ran successfully, no error.	COMMAND PARAMETERS OK
Protocol Errors:	
Syntax error	ERR001
Command not available for this device	ERR002
Parameter is out of range	ERR003
Unauthorized access (command run without the matching login).	ERR004

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10.4 Basic Routing Commands

Switch audio	AUD IN>OUT, IN>OUT, … Short form: A IN>OUT, IN>OUT, …	AUD IN>OUT, IN>OUT, …RESULT
Read audio connection	AUD? OUT Short form: A? OUT AUD? *	AUD IN>OUT AUD IN>1, IN>2, …

Parameter Description:

IN = Input number or '0' to disconnect output.

'>' = Connection character between in and out parameters.

OUT = Output number or '*' for all outputs.

Example:

Switch audio input 2 to output 1	#A 2>1CR	~AUD 2>1 OKCRLF

10.5 Preset Commands

Command	Syntax	Response
Store current connections to preset	PRST-STO PRESET Short form: PSTO PRESET	PRST-STO PRESET RESULT
Recall saved preset	PRST-RCL PRESET Short form: PRCL PRESET	PRST-RCL PRESET RESULT
Delete saved preset	PRST-DEL PRESET Short form: PDEL PRESET	PRST-DEL PRESET RESULT
Read audio connections from saved preset	PRST-AUD? PRESET,OUT Short form: PAUD? PRESET,OUT PRST-AUD? PRESET, *	PRST-AUD PRESET: IN>OUT PRST-AUD PRESET: IN>1, IN>2,…
Read saved presets list	PRST-LST? Short form: PLST?	PRST-LST PRESET, PRESET, …

Parameter Description:

PRESET = Preset number.

OUT = Output in preset to display, '*' for all.

Examples:

Store current audio connections to preset 5	#PRST-STR 5CR	~PRST-STR 5 OKCRLF
Recall audio connections from preset 3	#PRCL 3CR	~PRST-RCL 3 OKCRLF

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10.6 Audio Parameter Commands

Command	Syntax	Response
Set simple audio volume	VOLUME VOLUME Short form: VOL VOLUME	VOLUME VOLUME RESULT
Increase/decrease simple audio volume	VOLUME +/- Short form: VOL +/-	VOLUME +/- RESULT
Read simple audio level	VOLUME? Short form: VOL?	VOLUME VOLUME
Set audio level in specific amplifier stage.	AUD-LVL STAGE, CHANNEL, VOLUME Short form: ADL STAGE, CHANNEL, VOLUME	AUD-LVL STAGE, CHANNEL, VOLUME RESULT
Read audio volume level	AUD-LVL? STAGE, CHANNEL Short form: ADL? STAGE	AUD-LVL STAGE, CHANNEL, VOLUME

Advanced commands for controlling each stage of audio amplification:

Set audio bass level	BASS BASS Short form: ADB, BASS	BASS BASS RESULT
Read audio bass level	BASS? Short form: ADB?	BASS BASS
Set audio treble level	TREBLE TREBLE Short form: ADT TREBLE	TREBLE TREBLE RESULT
Read audio treble	TREBLE? Short form: ADT?	TREBLE TREBLE
Set audio midrange	MIDRANGE MID_RANGE Short form: ADM MID_RANGE	MIDRANGE MID_RANGE RESULT
Read audio midrange	MIDRANGE? Short form: ADM?	MIDRANGE MID_RANGE
Set audio loudness	LOUDNESS LOUDNESS Short form: ADS LOUDNESS	LOUDNESS LOUDNESS RESULT
Read audio loudness	LOUDNESS? Short form: ADS?	LOUDNESS LOUDNESS
Set audio mix	MIX MIX-MODE	MIX MIX-MODE RESULT
Read audio mix	MIX?	MIX MIX-MODE
Mute audio	MUTE MUTE-MODE	MUTE MUTE-MODE RESULT
Read audio mute state	MUTE?	MUTE MUTE-MODE
Set balance mode	BALANCE BALANCE-LEVEL	BALANCE BALANCE-LEVEL RESULT
Read balance mode	BALANCE?	BALANCE BALANCE-LEVEL
Set equalizer	EQUALIZER BAND, EQ_LEVEL	EQUALIZER BAND, EQ_LEVEL RESULT
Read equalizer	EQUALIZER? BAND	EQUALIZER BAND, EQ_LEVEL
Set delay	DELAY DELAY_VOL	DELAY DELAY_VOL RESULT
Read delay	DELAY?	DELAY DELAY_VOL
Set talk over	TLK TALKOVER_MODE	TLK TALKOVER_MODE RESULT
Read talk over	TLK?	TLK TALKOVER_MODE
Set expand	EXPAND EXPAND_MODE	EXPAND EXPAND_MODE RESULT
Read expand	EXPAND?	EXPAND EXPAND_MODE
Set compress	COMPRESS COMPRESS_MODE	COMPRESS COMPRESS_MODE RESULT
Read compress	COMPRESS?	COMPRESS COMPRESS_MODE

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Parameter Description: STAGE = 'IN, 'OUT' or Numeric value of present audio processing stage. For example: '0' for input level, '1' for pre-amplifier, '2' for amplifier (OUT) etc. CHANNEL = Input or Output # VOLUME / BASS / TREBLE / MID_RANGE = Audio parameter in Kramer units, minus sign precedes negative values. ++ increase current value, -- decrease current value.			
MIX = '0' or 'OFF' '1' or 'ON'	TLK = '0' or 'OFF' '1' or 'ON'	EXPAND = '0' or 'OFF' '1' or 'ON'	COMPRESS = '0' or 'OFF' '1' or 'ON'

10.7 Identification Commands

Command	Syntax	Response
Protocol handshaking	#CR	~OK CRLF
Read device model	MODEL?	MODEL MACHINE_MODEL
Read device serial number	SN?	SN SERIAL_NUMBER
Read device firmware version	VERSION?	VERSION .MAJOR .MINOR .BUILD .REVISION
Set machine name	NAME MACHINE_NAME	NAME .MACHINE_NAME .RESULT
Read machine name	NAME?	NAME MACHINE_NAME
Reset machine name to factory default*	NAME-RST	NAME-RST MACHINE_FACTORY_NAME RESULT

***Note**: The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on).
MACHINE_NAME = Up to 14 alphameric chars.
* **Machine factory name =** Model name + last 4 digits from serial number.

10.8 Network Setting Commands

Command	Syntax	Response
Set IP address	NET-IP IP_ADDRESS Short form: NTIP	NET-IP IP_ADDRESS RESULT
Read IP address	NET-IP? Short form: NTIP?	NET-IP IP_ADDRESS
Read MAC address	NET-MAC? Short form: NTMC	NET-MAC MAC_ADDRESS
Set subnet mask	NET-MASK SUBNET_MASK Short form: NTMSK	NET-MASK SUBNET_MASK RESULT
Read subnet mask	NET-MASK? Short form: NTMSK?	NET-MASK SUBNET_MASK
Set gateway address	NET-GATE GATEWAY_ADDRESS Short form: NTGT	NET-GATE GATEWAY_ADDRESS RESULT
Read subnet mask	NET-GATE? Short form: NTGT?	NET-GATE GATEWAY_ADDRESS

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Command	Syntax	Response
Set DHCP mode	NET-DHCP DHCP_MODE Short form: NTDH	NET-DHCP DHCP_MODE RESULT
Read subnet mask	NET-DHCP? Short form: NTDH?	NET-DHCP DHCP_MODE

DHCP_MODE =
'0' – Don't use DHCP (Use IP set by factory or IP set command).
'1' – Try to use DHCP, if unavailable use IP as above.

Change protocol Ethernet port	ETH-PORT PROTOCOL , PORT Short form: ETHP	ETH-PORT PROTOCOL ,PORT RESULT
Read protocol Ethernet port	ETH-PORT? PROTOCOL Short form: ETHP?	ETH-PORT PROTOCOL , PORT

PROTOCOL = TCP/UDP (transport layer protocol)
PORT = Ethernet port that accepts Protocol 3000 commands
1-65535 = User defined port
0 - Reset port to factory default (50000 for UDP, 5000 for TCP)

10.9 Machine Information Commands

Command	Syntax	Response
Set device time and date	TIME DATE_TIME	TIME DATE_TIME RESULT
Read device time and date	TIME?	TIME? DATE_TIME

Note: Time setting commands require administrator authorization.

Read in/out count	INFO-IO?	INFO-IO: IN INPUTS_COUNT, OUT OUTPUTS_COUNT
Read max preset count	INFO-PRST?	INFO-PRST: AUD PRESET_AUDIO_COUNT
Reset to factory default configuration	FACTORY	FACTORY RESULT

10.10 Command Terms

Command
A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
Command and parameters must be separated by at least one space.

Parameters
A sequence of alphameric ASCII characters ('0'-'9','A'-'Z','a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string
Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.
Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

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Message starting character
'#' – For host command/query
'~' – For machine response

Device address (Optional, for K-NET)
K-NET Device ID followed by '@'

Query sign
'?' follows some commands to define a query request.

All outputs sign
'*' defines all outputs.

Message closing character
CR – For host messages; carriage return (ASCII 13)
CRLF – For machine messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character
When a message string contains more then one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

10.11 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial, Ethernet, or USB port on the Kramer device. To enter **CR** , press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

10.12 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

10.13 Command Chaining

Multiple commands can be chained in the same string. Each command is delimited by a pipe character ('|'). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

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Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

10.14 Maximum String Length

64 characters

10.15 Backward Support

Protocol 2000 is transparently supported by Protocol 3000. You can switch between protocols using a switch protocol command from either platform.

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Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

P/N: 2900-000492 Rev: 4

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